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1996 HAMILTON-WENTWORTH COLLISION REPORT

VOLUME 1: TRENDS AND LOCATIONS

PREPARED BY:

DEPARTMENT OF
PUBLIC WORKS AND TRAFFIC

City of
HAMILTON

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1996 Hamilton-Wentworth Collision Report

Volume 1: Trends and Locations

URBAN MUNICIPAL

Prepared For:

OCT 17 1997

The Transportation Department
of the Regional Municipality of Hamilton-Wentworth
and
The Hamilton-Wentworth Regional Police Department

GOVERNMENT DOCUMENTS

By:

The City of Hamilton Public Works and Traffic Department

Project Manager:
H.L. Solomon, P. Eng.

ACKNOWLEDGEMENTS

The Project Staff of the Hamilton Traffic Department wish to express their appreciation to the members of the Transportation and Planning Departments of the Regional Municipality of Hamilton-Wentworth, the Regional Police Department and the Ministry of Transportation of Ontario for their co-operation and assistance in the preparation of this report.

The Project Staff was comprised of Ms. Linda Juchniewicz, Ms. Wendy Crevier, Mr. H. Solomon, and Mr. Rob Galloway of the Traffic Division. The Department wishes to thank Mr. Roland Salmon and the staff of the Services Division of the City Clerk's Department for their assistance in the printing of the report.

1996 HAMILTON-WENTWORTH COLLISION REPORT - VOLUME 1

Introduction

The annual report is a summary of factors associated with traffic collisions that occurred in the Regional Municipality of Hamilton-Wentworth. The 1996 report is comprised of two documents. This portion contains the overall frequencies and trends, plus location-specific data. The information in this portion is produced annually. A companion report details driver and pedestrian behaviour and road and weather conditions based on a 3-year average.

The Regional Municipality of Hamilton-Wentworth is situated in southern Ontario at the westerly end of Lake Ontario. The following municipalities are located within the Region: the Town of Ancaster; the Town of Dundas; the Town of Flamborough; the Township of Glanbrook; the City of Hamilton and the City of Stoney Creek. The estimated total population of these combined localities was 467,799 in 1996.

Traffic collisions are a primary cause of accidental deaths, injuries and associated property losses. The intention of this report is to provide factual information to those agencies and persons concerned with the safety of the roadway transportation system within the Regional Municipality of Hamilton-Wentworth.

Traffic collisions frequently involve complex interactions between human behaviour, vehicle characteristics and environmental conditions. The factor or factors responsible for causing a collision are not always the most obvious nor are they always readily apparent. Caution should be exercised in drawing conclusions from the statistics presented in this report and conclusions should be drawn only with appropriate qualifications and supportive information.

The information presented in this report is based primarily upon motor vehicle collisions investigated by the Hamilton-Wentworth Regional Police. All collisions occurring in Hamilton-Wentworth are included in the statistics in this report excluding collisions occurring on the Queen Elizabeth Way and Highway 403 and on-ramps and off-ramps to those highways. Collisions occurring on service roads to the Queen Elizabeth Way are included.

1996 COMPARED WITH PREVIOUS YEARS

1. Overall Collisions

300 fewer collisions were reported in 1996 than in 1995. The total number of collisions reported in 1996 was the lowest in the past 3 decades. However, this should be qualified by the fact that a citizen's report form was introduced in 1994 to record collisions below the normal injury qualifications or minimal property damage limits. It has been noted by the Hamilton-Wentworth Regional Police Department that an undetermined number of reportable collisions are being recorded on the citizen's report form thereby possibly lowering the true number of reportable collisions. However, these are primarily property damage collisions and this should not materially affect the number of injury collision reports.

The occurrence of injury collisions also decreased from 1995, by 8 injury collisions. The number of injury collisions reported was also the lowest in 30 years. The number of fatal collisions in 1996 was 14.

2. Bicycle Injuries

The number of people injured in motor vehicle collisions while riding on a bicycle decreased by 16 from 1995 to 1996. There was only 1 cyclist fatality in 1996.

3. Pedestrian Fatalities

In 1996, there were 7 pedestrian fatalities, one less than 1995.

4. Alcohol Involvement

Alcohol involvement in motor vehicle collisions has been, on average, steadily decreasing since 1978. In the years 1990 to present, alcohol involvement in collisions averaged 5.8 percent, compared to 10.3 percent for the previous 12 years. The rate was 5.9 percent in 1996, a slight increase over 1995. The involvement of young drivers (under 21) who had been drinking increased noticeably over 1995 and was the highest rate since 1988.

SUMMARY

- * In 1996, 5,687 reported traffic collisions occurred on municipal roadways in the Regional Municipality of Hamilton-Wentworth. These collisions resulted in:
 - 6 driver, no passenger fatalities
 - 1 cyclist fatality
 - 7 pedestrian fatalities
 - 2,750 driver, cyclist or passenger injuries (not including fatalities)
 - 302 pedestrian injuries (not including fatalities)
 - 16,353 persons (equal to approximately 3.5 percent of the Regional population) being involved in a reported traffic collision
- * The overall frequency of collisions in Hamilton-Wentworth is generally lower than other major Canadian municipalities.

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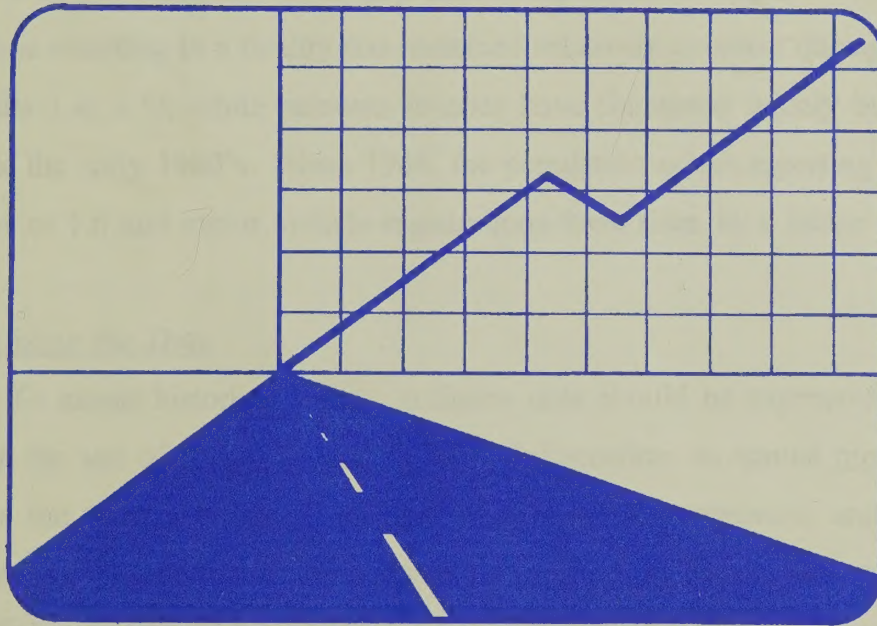
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1996 COMPARED WITH PREVIOUS YEARS

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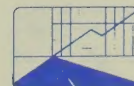
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Chapter One

Trends



Chapter 1

General

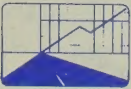
Since peaking in 1966, the overall number of motor vehicle collisions and the number of pedestrians injured in motor vehicle collisions in the Regional Municipality of Hamilton-Wentworth has exhibited a steadily decreasing trend (Exhibits 1.4, 1.6). The number of collisions resulting in a fatality has remained relatively constant during the same time period (Exhibits 1.4, 1.5), while personal injuries have fluctuated widely but are presently at the level of the early 1960's. Since 1966, the population of the reporting area has increased by a factor of 1.6 and motor vehicle registrations have risen by a factor of 3.0.

Normalizing the Data

To assess historical trends, collision data should be expressed as a normalized rate through the use of one of several factors. Information on annual motor vehicle use would provide the most accurate assessment of a motorist's exposure, and hence, likelihood of involvement in a collision. Motor vehicle registration data is somewhat less accurate as a normalizing factor, but is utilized later in this report since exposure information is not available. Population also provides a suitable and accurate normalizing factor. Exhibits 1.1, 1.2, 1.3 and associated analysis in the rest of this chapter refer to data which has been calculated on a population **rate** basis (based on 1996 population data), rather than on the basic number of occurrences.

Collisions

The overall motor vehicle collision rate is shown in Exhibit 1.1. As of January 1, 1978, the reporting level for property damage only collisions was raised from \$200.00 to \$400.00. On January 1, 1985, it was raised again from \$400.00 to \$700.00. The reporting area also increased in 1974. Considering these changes, the rate for total collisions appears to show a decline from 1977 to 1992. 1993 shows the first significant increase in 5 years. **However, 1996 shows the lowest rate experienced in the 30 years for which records have been kept.** The rate of collisions involving injury or fatality shows a modest decline from 1973 to 1993 (Exhibit 1.1). **Injury collisions are also at the lowest rate for the 30-year record keeping period.** Individual trends of injuries and fatalities are discussed below.



Injuries

The rate of personal injury (Exhibits 1.2, 1.5) is rather volatile. However, since 1989, the rate of personal injury has been on the decline and the rate of personal injury in 1996 is the lowest it has been since 1965. This volatility is likely related to the nature and severity of the collisions which could be the result of a number of factors. The rate and number of pedestrian injuries (Exhibits 1.3, 1.6) shows a significant and continuing decline from 1966 to 1992 and a period of stability from 1992 to the present.

Of the 16,353 persons involved in collisions, in 1996, 3066 received injuries. The chance of an involved person sustaining injury in a collision varied from 15.5 percent for a motor vehicle passenger, to 95.1 percent for a pedestrian. The risk of injury appears to be significantly higher for cyclists and pedestrians (Exhibit 1.8). The percentages are high for cyclists and pedestrians, as it is unlikely that this type of collision could occur with no personal injury and less than \$700.00 total property damage.

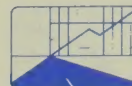
Fatalities

In 1996, 14 persons died in motor vehicle collisions in Hamilton-Wentworth. Fatal collisions are rare events and small changes in the number of fatalities cause large fluctuations in the fatality rate (Exhibit 1.2, 1.4).

In 1996, 7 pedestrians died in motor vehicle collisions. The fatality rate for pedestrians (Exhibit 1.3, 1.6) displays a general reducing trend, especially since 1978.

Alcohol Involvement

When viewed as a proportion of overall collisions, alcohol involvement (Exhibit 1.7) has been, on average, steadily decreasing since 1978. In the years 1988 to 1996, collision involvement remained relatively constant with an average of 5.8 percent which is much lower than the previous 12-year average of 10.3 percent. The 1996 percentage of 5.9 is a slight increase over 1995. The percentage of total fatal collisions that were alcohol-related has been generally decreasing since 1984, with the exception of 1989, 1993 and 1996. An average of



15 percent of all fatal collisions between 1987 and the present have been alcohol-related, with the average for the past 3 years being 14.0 percent. In 1996, that statistic increased to 21.4 percent. The percentage of impaired/had- been-drinking drivers under the age of 21 has steadily been declining since 1979, with the exception of 1986. However, the 1996 percentage of young drivers in collisions who had been drinking was the highest since 1988. These figures indicate that, in recent years, alcohol involvement in collisions has been declining, but 1996 the trends were reversed.

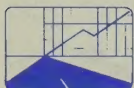
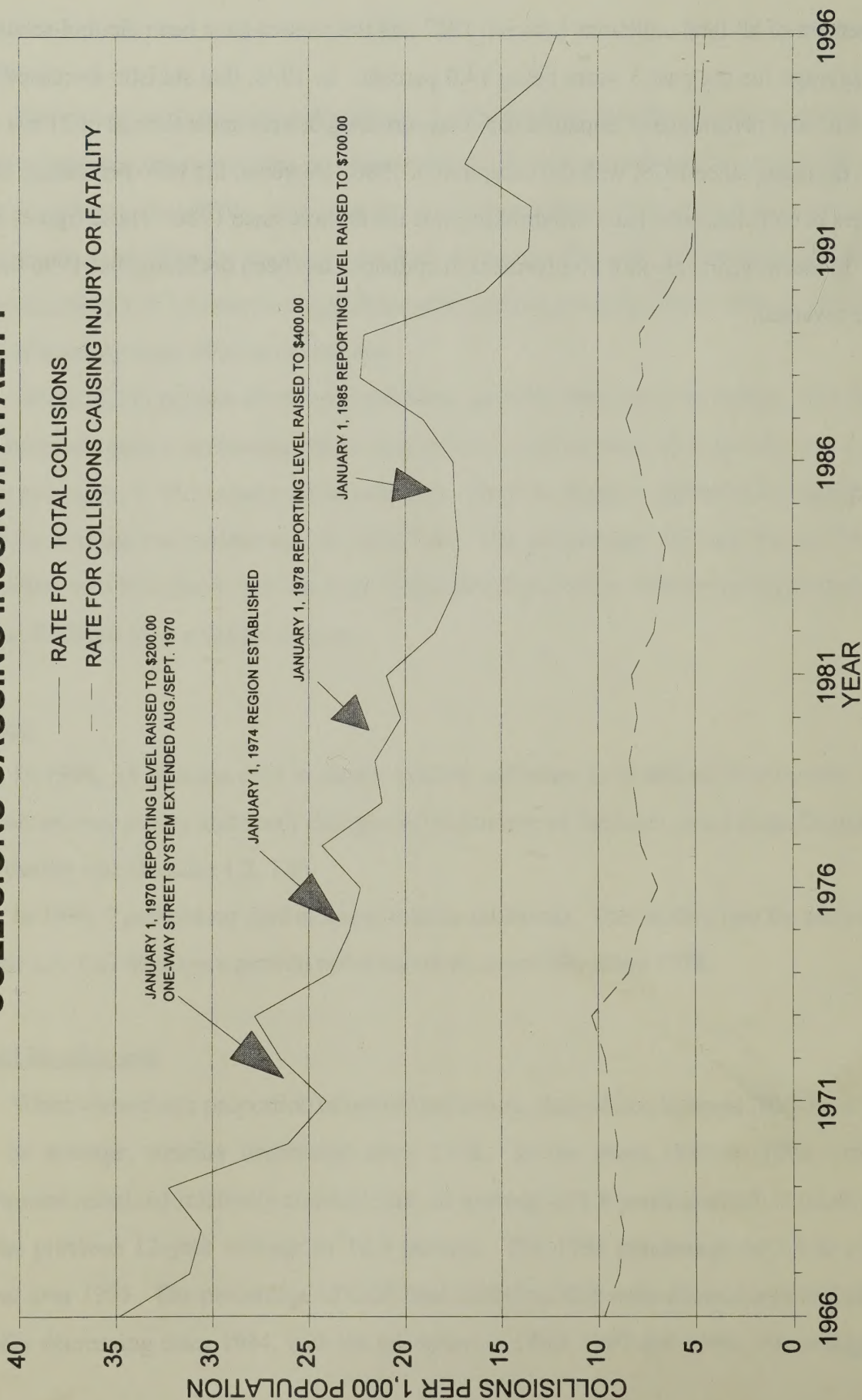
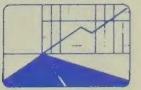
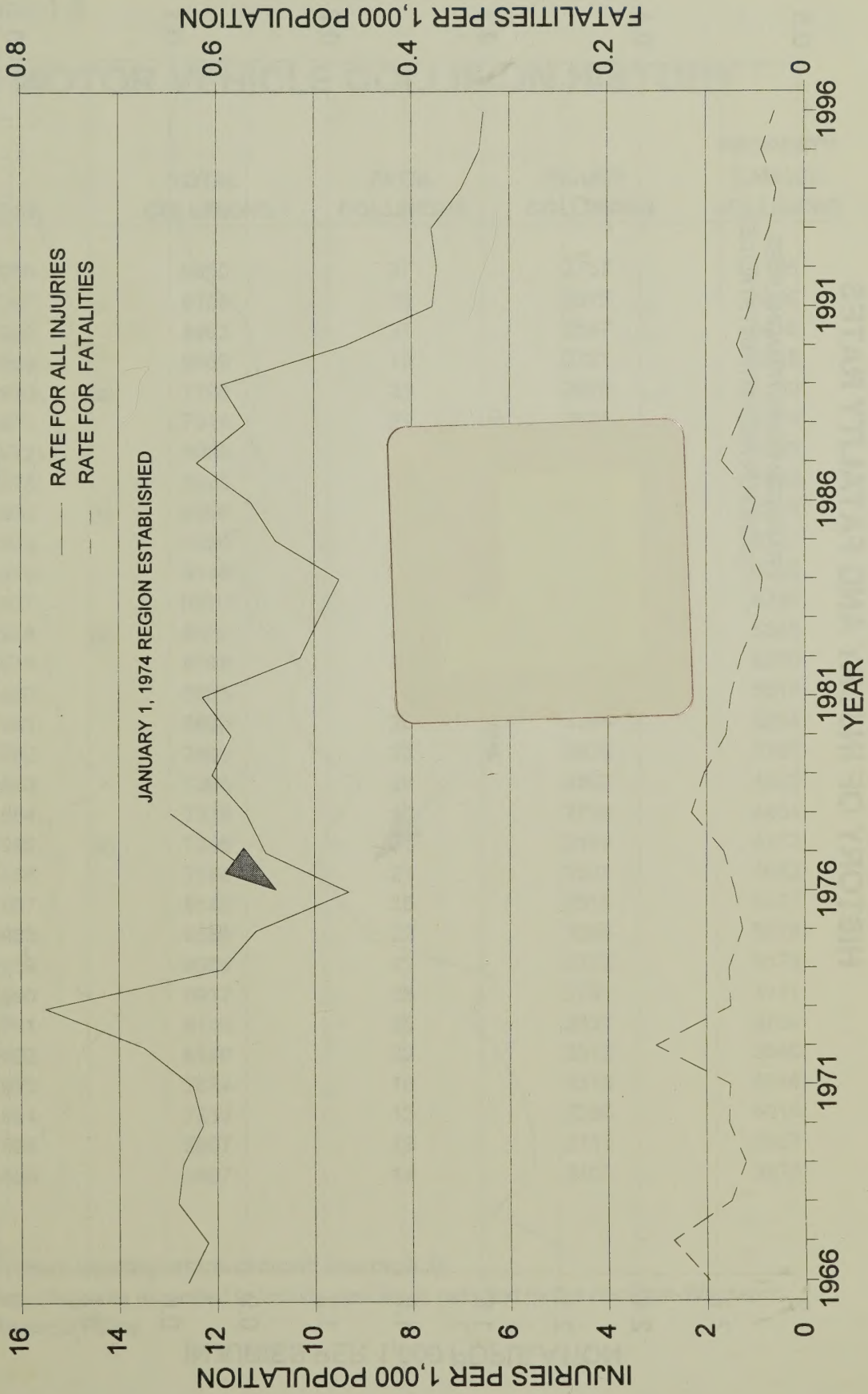


Exhibit 1.1

MOTOR VEHICLE COLLISIONS: HISTORY OF RATES OF TOTAL COLLISIONS & COLLISIONS CAUSING INJURY/FATALITY



PERSONAL INJURIES/FATALITIES: HISTORY OF INJURY AND FATALITY RATES CAUSED BY MOTOR VEHICLE COLLISIONS



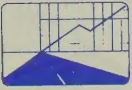
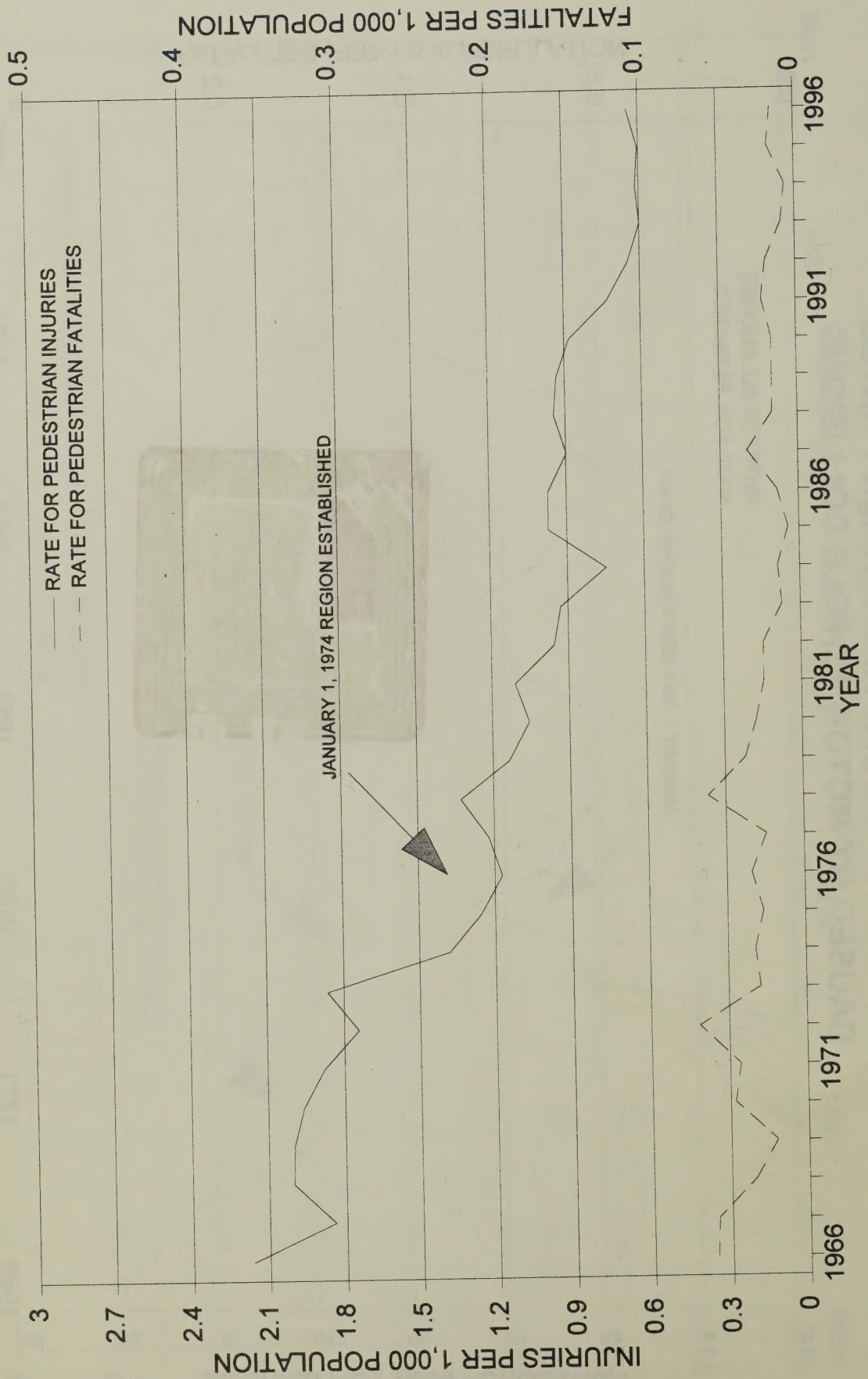


Exhibit 1.3 PEDESTRIANS INVOLVED IN COLLISIONS: HISTORY OF INJURY AND FATALITY RATES



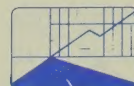


Exhibit 1.4

MOTOR VEHICLE COLLISION HISTORY

YEAR		TOTAL COLLISIONS	FATAL COLLISIONS	INJURY COLLISIONS	PROPERTY DAMAGE COLLISIONS
1966		9950	27	2757	7166
1967		9106	35	2575	6496
1968		8983	21	2547	6415
1969		9589	19	2721	6849
1970	(a)	7799	23	2676	5100
1971		7314	22	2821	4471
1972		8065	39	2901	5125
1973		8499	23	3143	5333
1974	(b)	9599	29	3364	6206
1975		9354	24	3219	6111
1976		9146	28	2816	6302
1977		10011	33	3182	6796
1978	(a)	8636	45	3246	5345
1979		8798	39	3389	5370
1980		9305	33	3253	5019
1981		8660	28	3398	5234
1982		7663	23	2939	4701
1983		7268	20	2839	4409
1984		7228	18	2726	4484
1985	(a)	7346	21	3153	4172
1986		7434	21	3331	4082
1987		8140	35	3615	4491
1988		9586	22	3285	6279
1989		9566	21	3372	6173
1990		6917	25	2751	4141
1991		6145	25	2331	3789
1992		6180	22	2312	3846
1993		7674	15	2313	5346
1994		7233	13	2205	5015
1995		5987	19	2111	3857
1996		5687	14	2103	3570

(a) Collision reporting criteria changed (see page 3).

(b) Reporting area expanded to include new areas patrolled by the Hamilton-Wentworth Regional Police.

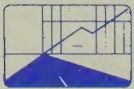


Exhibit 1.5

HISTORY OF PERSONAL INJURIES AND FATALITIES CAUSED BY MOTOR VEHICLE COLLISIONS

YEAR	TOTAL COLLISIONS	PERSONS INJURED	PERSONAL INJURIES/1,000 POPULATION	NUMBER OF FATALITIES	FATALITIES/ 100,000 POPULATION	FATALITIES/ 10,000 REGISTERED VEHICLES	
1962	8338	2542	9.5	32	11.9	3.8	
1963	9554	3075	11.6	27	10.2	3.0	
1964	9948	3305	11.9	32	11.5	3.4	
1965	10783	3824	13.4	27	9.5	2.6	
1966	9950	3746	12.6	28	9.8	2.6	
1967	9106	3484	12.2	39	13.7	3.6	
1968	8983	3574	12.8	22	7.9	1.9	
1969	9589	3768	12.7	19	6.4	1.6	
1970 (a)	7799	3717	12.3	23	7.5	2.0	
1971	7314	3876	12.5	23	7.0	1.9	
1972	8065	4055	13.5	46	15.3	3.4	(b)
1973	8499	4951	15.5	23	7.2	1.6	
1974 (c)	9599	4678	11.9	31	7.9	2.0	(b)
1975	9354	4474	11.2	26	6.5	1.6	(b)
1976	9146	3811	9.3	29	7.1	1.8	(b)
1977	10011	4513	11.0	34	8.3	2.0	(b)
1978 (a)	8636	4635	11.4	47	11.6	2.1	(d)
1979	8798	4923	12.1	42	10.3	2.2	(d)
1980	8305	4800	11.7	33	8.0	1.4	(d)
1981	8660	5015	12.3	31	7.6	1.1	(d)
1982	7663	4175	10.3	27	6.6	0.9	
1983	7268	4041	9.9	20	4.9	1.1	(e)
1984	7228	3855	9.5	18	3.8	0.8	(e)
1985 (a)	7346	4529	10.8	26	6.2	1.2	(e)
1986	7434	4758	11.3	21	5.0	0.9	(e)
1987	8140	5220	12.4	36	8.4	1.5	(e)
1988	9586	4898	11.4	29	6.8	1.2	(e)
1989	9566	5145	11.9	22	5.1	0.9	(e)
1990	6917	4053	9.4	30	6.9	1.2	(e)
1991	6415	3420	7.6	25	5.5	1.0	(d)
1992	6180	3439	7.5	23	5.0	0.8	(e)
1993	7674	3421	7.6	16	3.5	0.5	(e)
1994	7233	3213	7.4	13	2.8	0.4	(e)
1995	5987	3061	6.7	20	4.3	0.6	(e)
1996	5687	3066	6.6	14	2.9	0.4	(e)

(a) Collision reporting criteria changed (see page 3).

(b) Registration estimated from total Ontario registrations.

(c) Reporting area expanded to include new areas patrolled by the Hamilton-Wentworth Regional Police.

(d) Registration data from licence information.

(e) Registration data from licence information for Wentworth County.

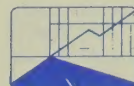


Exhibit 1.6

HISTORY OF PEDESTRIAN AND CYCLIST INJURIES AND FATALITIES

YEAR	COLLISIONS INVOLVING PEDESTRIANS (c)	PEDESTRIANS INJURED (a)	PEDESTRIAN FATALITIES	COLLISIONS INVOLVING CYCLISTS (c)	CYCLISTS INJURED (a)	CYCLIST FATALITIES
1965		582	17		140	0
1966		618	17		132	1
1967		537	17		113	0
1968		588	10		84	1
1969		602	6		91	2
1970		586	14		101	1
1971		570	13		155	2
1972		530	21		156	2
1973		569	9		197	1
1974 (b)		555	13		192	3
1975		513	11		235	0
1976		480	14		195	0
1977		503	10		193	3
1978		542	25		162	1
1979		464	15		177	4
1980		434	12		178	1
1981		458	10		159	1
1982		396	10		252	2
1983		387	5		200	2
1984		314	6		175	1
1985		410	3		239	2
1986	384	412	6	229	228	2
1987	379	383	14	244	244	2
1988	401	406	7	239	225	0
1989	411	403	7	164	154	3
1990	381	383	7	208	195	0
1991	332	330	10	193	185	3
1992	300	297	9	219	209	3
1993	299	291	4	201	183	0
1994	290	283	3	196	185	2
1995	293	286	8	163	152	1
1996	303	302	7	150	135	1

(a) One or more pedestrian/cyclist could be involved and a fatality/injury may not have occurred. Includes injuries and fatalities.

(b) Prior to this year, reporting was for the City of Hamilton only.

(c) This information was not available until 1986.

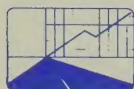


Exhibit 1.7

HISTORY OF ALCOHOL - RELATED MOTOR VEHICLE COLLISIONS

YEAR	TOTAL REPORTED COLLISIONS	TOTAL ALCOHOL- RELATED COLLISIONS	% OF TOTAL COLLISIONS INVOLVING ALCOHOL	% IMPAIRED OR HAD BEEN DRINKING DRIVERS UNDER THE AGE OF 21	TOTAL FATAL COLLISIONS	ALCOHOL- RELATED FATAL COLLISIONS (a)	% FATAL COLLISIONS HAVING ALCOHOL INVOLVED
1978	8636	1128	13.1	22.1	45	11	24.4
1979	8798	1139	12.9	22.1	39	5	12.8
1980	8305	929	11.2	18.7	33	11	33.3
1981	8660	1053	12.2	16.4	28	8	28.6
1982	7663	895	11.7	19.0	23	3	13.0
1983	7268	765	10.5	18.6	20	5	25.0
1984	7228	729	10.1	15.0	18	5	27.8
1985	7346	644	8.8	12.7	21	5	23.8
1986	7434	596	8.0	20.5	21	4	19.0
1987	8140	589	7.2	11.9	35	5	14.3
1988	9586	582	6.1	9.9	22	2	9.1
1989	9566	542	5.7	6.7	21	6	28.6
1990	6917	430	6.2	6.6	25	4	16.0
1991	6145	385	6.3	7.6	25	3	12.0
1992	6180	398	6.4	2.1	22	0	0.0
1993	7674	397	5.1	5.5	15	4	26.7
1994	7233	359	5.0	4.7	13	2	15.4
1995	5987	327	5.5	3.7	19	1	5.3
1996	5687	340	5.9	7.9	14	3	21.4

(a) Includes drivers classified as impaired due to alcohol or classified as had been drinking.

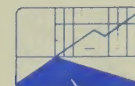


Exhibit 1.8

INJURY STATUS OF ALL PERSONS INVOLVED

DESCRIPTION OF PERSONS INVOLVED	PERSONS INVOLVED	PERSONAL INJURIES & FATALITIES	% OF PERSONS INJURED/ PERSONS INVOLVED	TYPE OF INJURY*			
				FATAL	MAJOR	MINOR	MINIMAL
DRIVER**	9930	1700	17.1%	6	69	648	977
CYCLIST	156	136	87.2%	1	10	61	64
PASSENGER	5942	921	15.5%	0	48	349	524
PEDESTRIAN	325	309	95.1%	7	38	132	132
TOTAL	16353	3066	18.7%	14	165	1190	1697

FOR APPROXIMATELY EVERY 29 RESIDENTS OF THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH, 1 PERSON WAS INVOLVED IN A MOTOR VEHICLE COLLISION IN 1996.

THERE WAS APPROXIMATELY A 1 IN 5 CHANCE THAT A PERSON INVOLVED IN A TRAFFIC COLLISION WOULD BE INJURED.

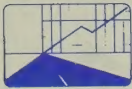
* Definitions of injury types:

Major: Person admitted to the hospital for treatment of injuries received in the collision.

Minor: Person went to the hospital for medical treatment but was released without being admitted.

Minimal: Person did not go to a hospital for medical treatment upon leaving the scene of the collision.

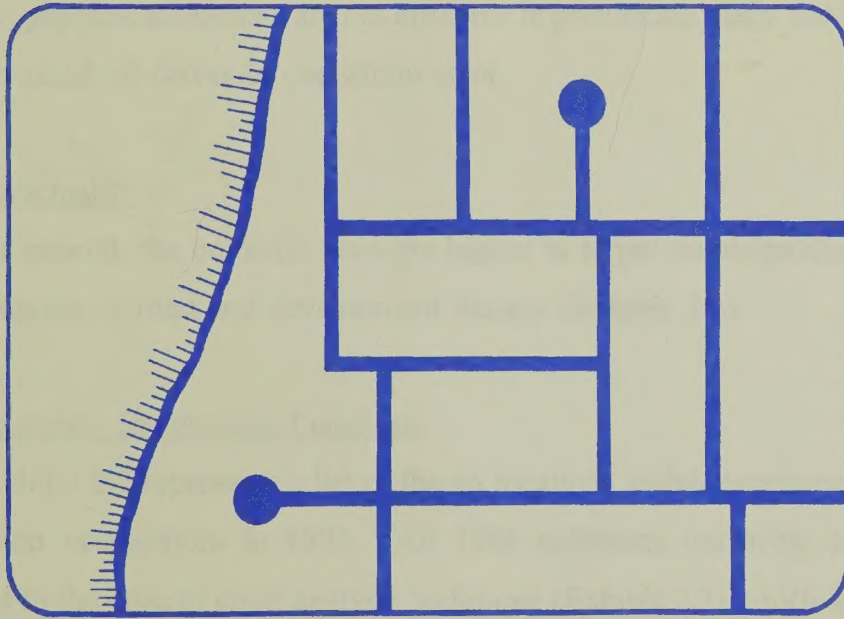
**does not include hit & run or Failed To Remain drivers.



1996 Hamilton-Wentworth Collision Report Volume 1

TRENDS

Table with multiple columns and rows, containing data related to vehicle collisions. The table is oriented vertically on the page.



Chapter Two

Locations



Chapter 2

General

Locations that have high numbers or rates of collision occurrence have received regular attention by roadway authorities in the Region. Countermeasures are constantly being implemented for existing facilities and incorporated into the design of new facilities. However, physical alterations are not effective in preventing many traffic collisions which are the direct result of driver or pedestrian error.

Area Municipality

In general, the collision rates are higher in larger municipalities and with those with higher degrees of road and development density (Exhibit 2.1).

High Frequency Intersection Locations

Exhibit 2.2 represents a list of the 46 locations which experienced the highest number of collision occurrences in 1996. All 1996 collisions occurring at traffic signals were subjected to the control chart analysis technique (Exhibit 2.3) which analyzes rates based on volumes of traffic. Exhibit 2.3 also provides a five-year average for each intersection.

Exhibits 2.4 and 2.5 show two-way stop locations and all-way stop locations with the highest collision rates.

These exhibits do not necessarily represent priority lists for improvements as other factors have to be taken into account such as cost-benefit considerations or the deployment of other collision countermeasures which may be more cost-effective.

In many cases, countermeasures have already been implemented or these locations are under consideration for various forms of improvement on a priority basis.

Exhibits 2.6 and 2.7 provide data on rates of collision occurrence on urban roadway sections, showing the 25 sections of major roadway with the highest rates. Exhibit 2.6 shows rates which are calculated including collisions at unsignalized intersections but excluding collisions at signalized intersections. Exhibit 2.7 shows rates which are calculated excluding any collisions occurring within 9 m of an intersection (signalized or unsignalized).



Comparison of Hamilton and Hamilton-Wentworth with other Cities

On the basis of total collisions per 1,000 population, Hamilton and Hamilton-Wentworth are very close to the lowest rates in Canada (Exhibit 2.8). On the basis of injury collisions per 1,000 population, the City and Region are better than average.



Exhibit 2.1

COLLISIONS vs AREA MUNICIPALITY

MUNICIPALITY	CLASS OF COLLISION (a)				1996 COLLISION RATE PER 1,000 POP.(c)
	FATAL	NON- FATAL INJURY	PROPERTY DAMAGE ONLY	ALL COLLISIONS (b)	
ANCASTER	0	98	145	243	10.4
DUNDAS	2	53	101	156	6.7
FLAMBOROUGH	2	77	167	246	7.2
GLANBROOK	0	36	63	99	9.4
CITY OF HAMILTON	8	1661	2804	4473	13.9
STONEY CREEK	2	178	290	470	8.7
TOTAL FOR THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH	14	2103	3570	5687	12.2

(a) Collisions reported to the Hamilton-Wentworth Regional Police only; areas patrolled by the Provincial Police (e.g. Kings Highways) are not included.

(b) Location data missing from a small number of collisions.

(c) Population figure extrapolated based on 1994 population data for each municipality.



Exhibit 2.2

INTERSECTIONS WITH THE HIGHEST NUMBER OF COLLISIONS IN 1996 (a)

INTERSECTION (b)	TYPE OF TRAFFIC CONTROL	NUMBER OF COLLISIONS	5-YEAR AVERAGE
1 CENTENNIAL & HWY 8/QUEENSTON (SC)	TRAFFIC SIGNAL	22	19.8
2 JOHN & WILSON	TRAFFIC SIGNAL	21	15.0
3 NASH & QUEENSTON	TRAFFIC SIGNAL	20	17.2
4 KENILWORTH & MAIN	TRAFFIC SIGNAL	19	12.0
5 HUNTER & JOHN	TRAFFIC SIGNAL	18	10.6
6 BARTON & GAGE	TRAFFIC SIGNAL	15	15.2
7 KENTLEY & NASH	TRAFFIC SIGNAL	14	5.4
8 KING & PARKDALE	TRAFFIC SIGNAL	14	10.4
9 QUEENSDALE & UPPER GAGE	TRAFFIC SIGNAL	14	10.8
10 BARTON & CENTENNIAL	TRAFFIC SIGNAL	13	13.6
11 BARTON & STRATHEARNE	TRAFFIC SIGNAL	13	8.2
12 BARTON & WOODWARD	TRAFFIC SIGNAL	13	10.2
13 FENNELL/SCENIC & GARTH	TRAFFIC SIGNAL	13	10.8
14 BURLINGTON & OTTAWA	TRAFFIC SIGNAL	12	7.6
15 CATHARINE & REBECCA	WB STOP	12	9.2
16 DUNDURN & MAIN	TRAFFIC SIGNAL	12	17.2
17 DUNDURN & YORK	TRAFFIC SIGNAL	12	9.4
18 LONGWOOD & MAIN	TRAFFIC SIGNAL	12	7.8
19 MAIN & SANFORD	TRAFFIC SIGNAL	12	6.6
20 MOHAWK & UPPER WENTWORTH	TRAFFIC SIGNAL	12	12.2
21 CENTENNIAL & KING (SC)	TRAFFIC SIGNAL	11	7.8
22 DUNDURN & KING	TRAFFIC SIGNAL	11	17.6
23 FENNELL & UPPER GAGE	TRAFFIC SIGNAL	11	5.4



INTERSECTION (b)	TYPE OF TRAFFIC CONTROL	NUMBER OF COLLISIONS	5-YEAR AVERAGE
24 JOHN & MAIN	TRAFFIC SIGNAL	11	11.4
25 LOCKE & YORK	TRAFFIC SIGNAL	11	11.4
26 MAIN & WENTWORTH	TRAFFIC SIGNAL	11	8.6
27 PARKDALE & HWY 8/QUEENSTON	TRAFFIC SIGNAL	11	10.6
28 BARTON & VICTORIA	TRAFFIC SIGNAL	10	7.6
29 CATHARINE & MAIN	TRAFFIC SIGNAL	10	7.4
30 KENILWORTH ACCESS & SHERMAN ACCESS	EB STOP	10	9.2
31 LIMERIDGE & UPPER JAMES	TRAFFIC SIGNAL	10	9.2
32 BOOK & FIDDLERS GREEN (A)	EW STOP	9	6.4
33 CANNON/YORK & QUEEN	TRAFFIC SIGNAL	9	8.6
34 CAROLINE & MAIN	TRAFFIC SIGNAL	9	6.6
35 DEWITT & HWY 8/QUEENSTON (SC)	TRAFFIC SIGNAL	9	4.2
36 FENNELL & UPPER JAMES	TRAFFIC SIGNAL	9	9.2
37 FENNELL & UPPER SHERMAN	TRAFFIC SIGNAL	9	7.2
38 MAIN & QUEEN	TRAFFIC SIGNAL	9	6.2
39 MAIN & WELLINGTON	TRAFFIC SIGNAL	9	11.0
40 ABERDEEN & DUNDURN	TRAFFIC SIGNAL	8	11.6
41 BARTON & LOTTRIDGE	TRAFFIC SIGNAL	8	4.8
42 BARTON & WENTWORTH	TRAFFIC SIGNAL	8	7.8
43 BURLINGTON & GAGE	TRAFFIC SIGNAL	8	5.0
44 BURLINGTON & KENILWORTH	TRAFFIC SIGNAL	8	6.2
45 CANNON & GAGE	TRAFFIC SIGNAL	8	9.2
46 FENNELL & UPPER OTTAWA	TRAFFIC SIGNAL	8	6.0

(a) Only collisions occurring within 31 feet (9.5 m) of the intersection are defined as being "in" the intersection and are included in this list.

(b) All intersections are in the City of Hamilton unless otherwise indicated:

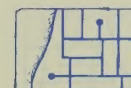
(A) Ancaster; (SC) Stoney Creek.



Exhibit 2.3

SIGNALIZED INTERSECTIONS WITH THE HIGHEST COLLISION RATES FROM 1992 to 1996

	INTERSECTION	RL (a)		RC (b)	RL/RC	AVG.3-YR AWDT (c)	NUMBER OF COLLISIONS					5-YR AVG. COMMENT	
		1992	1993				1994	1995	1996	AVG.	COMMENT		
1	LIMERIDGE RD & GARTH ST	1.74	0.95	1.84	20327	18	12	16	11	5	12.4	(d)	
2	KING WILLIAM ST & CATHARINE ST	1.69	1.40	1.21	6785	4	7	5	1	3	4.0	(d)	
3	WILSON ST & JOHN ST	1.57	0.87	1.79	27349	9	20	13	12	21	15.0	(d)	
4	QUEENSDALE AVE & UPPER GAGE AVE	1.57	0.96	1.63	19337	8	7	10	14	14	10.6	(e)	
5	BARTON ST & GAGE AVE	1.31	0.84	1.57	32646	12	21	15	12	15	15.0	(f)	
6	CANNON ST & HUGHSON ST	1.31	0.97	1.35	19249	3	6	16	14	5	8.8		
7	QUEENSTON RD & NASH RD	1.22	0.80	1.53	39917	17	20	9	19	20	17.0	(e)	
8	CHARLTON AVE & HESS ST	1.16	1.19	0.98	10340	6	5	6	1	3	4.2	(g)	
9	CANNON ST & GAGE AVE	1.16	0.92	1.26	22693	6	13	11	8	8	9.2	(h)	
10	ABERDEEN AVE & DUNDURN ST	1.15	0.86	1.33	28922	12	15	12	11	8	11.6		
11	HUNTER ST & CAROLINE ST	1.14	1.34	0.85	7507	4	2	4	5	0	3.0		
12	HUNTER ST & JOHN ST	1.10	0.87	1.26	27591	4	7	12	12	18	10.6	(g)(i)	
13	KING ST (SC) & GREEN RD	1.07	1.09	0.99	13372	5	4	5	6	5	5.0		
14	KING ST & DUNDURN ST	1.06	0.76	1.39	47970	20	16	22	20	11	17.8		
15	KENTLEY DR & NASH RD	1.05	1.05	1.00	14651	2	3	3	5	14	5.4	(i)	
16	BARTON ST & QUEEN/STUART STS	1.01	1.22	0.83	9624	0	4	6	4	3	3.4		
17	BARTON ST & BAY ST	1.01	1.13	0.89	11902	4	4	3	4	6	4.2		
18	BARTON ST & WENTWORTH ST	0.99	0.92	1.07	22538	7	6	11	7	8	7.8		
19	BARTON ST & JOHN ST	0.98	1.01	0.98	16927	3	10	4	8	4	5.8	(g)	
20	CANNON ST & JOHN ST	0.94	0.90	1.05	24934	11	9	13	5	3	8.2		
21	BARTON ST & STRATHEARNE AVE	0.92	0.89	1.03	25446	7	3	12	6	13	8.2		
22	KING ST & PARKDALE AVE	0.92	0.84	1.10	32326	10	7	5	16	14	10.4		
23	MAIN ST & PARKDALE AVE	0.91	0.95	0.96	20033	7	14	5	2	4	6.4		
24	QUEENSDALE AVE & UPPER WENTWORTH ST	0.91	1.09	0.84	13160	3	5	5	7	1	4.2		



INTERSECTION		RL (a)	RC (b)	RL/RC	AVG.3-YR AWDT (c)	NUMBER OF COLLISIONS					5-YR AVG.	COMMENT
					1992	1993	1994	1995	1996			
25	MOHAWK RD & UPPER OTTAWA ST	0.91	0.82	1.11	35835	24	4	3	4	11.4	(k)	
26	YORK BLVD & LOCKE ST	0.90	0.81	1.10	36382	13	15	12	11	11.4		
27	WILSON ST & HUGHSON ST	0.89	0.98	0.90	18071	2	11	2	5	5.6		
28	HUNTER ST & HESS ST	0.89	1.28	0.69	8392	6	1	3	2	1	2.6	
29	LIMERIDGE RD & UPPER GAGE AVE	0.87	0.83	1.05	34124	14	13	4	7	10.4		
30	BARTON ST & WOODWARD AVE	0.86	0.83	1.04	33963	10	8	6	13	10.2		
31	LAWRENCE RD & ROSEDALE AVE	0.85	1.10	0.77	12801	2	2	6	4	3.8		
32	YORK BLVD & HESS ST	0.85	0.95	0.89	20257	6	8	5	5	6.0		
33	CANNON ST & JAMES ST	0.84	0.85	0.99	29851	7	14	9	5	8.8		
34	MAIN ST & BAY ST	0.84	0.77	1.09	45511	16	15	14	7	13.4	(l)	
35	MAIN ST & DUNDURN ST	0.84	0.74	1.14	57370	14	17	17	12	16.8	(m)	
36	WILSON ST & CATHARINE ST	0.82	1.00	0.82	17482	4	6	5	3	5.0		
37	FENNELL AVE & GARTH ST	0.81	0.80	1.01	38161	12	11	9	13	10.8		
38	BARTON ST & WELLINGTON ST	0.80	0.87	0.92	27999	6	13	7	4	7.8		
39	BEACH RD & GAGE AVE	0.79	1.20	0.66	10100	5	1	4	0	2.8		
40	MAIN ST & MACKLIN ST	0.79	0.92	0.86	23181	3	8	7	8	6.4		
41	CANNON ST & CATHARINE ST	0.79	0.97	0.81	18926	5	3	5	5	5.2		
42	LIMERIDGE RD & WEST 5th ST	0.79	0.93	0.84	21851	5	7	3	6	6.0		
43	MAIN ST & VICTORIA AVE	0.78	0.78	1.00	43253	10	13	9	7	11.8		
44	MAIN ST & JOHN ST	0.78	0.78	0.99	42740	8	14	13	11	11.6	(n)	
45	MUD ST & PARAMOUNT DR	0.77	0.94	0.83	21417	3	5	8	6	5.8		
46	QUEENSTON RD (SC) & CENTENNIAL PKWY	0.76	0.72	1.07	65898	10	21	22	22	17.6		
47	BURLINGTON ST & OTTAWA ST	0.75	0.86	0.87	28842	5	9	6	12	7.6		
48	GOLFLINKS/MOHAWK & MOHAWK/STONE CHURCH	0.75	0.97	0.78	19012	5	1	5	8	5.0		
49	QUEENSTON RD & PARKDALE AVE	0.74	0.79	0.94	40721	4	15	16	11	10.6		
50	QUEENSTON RD & GREENFORD/KENORA	0.74	0.82	0.91	35353	9	11	8	5	9.2		
OVERALL STAT. FOR ALL SIGNAL INTERSECTIONS:		0.46								4.4		

NUMBER OF HAMILTON-WENTWORTH TRAFFIC SIGNAL INTERSECTIONS IN 1996 = 360*



Notes:

- (a) RL is the number of collisions, per million vehicles entering the intersection, occurring within 31 feet of an individual intersection.
- (b) RC is a volume-adjusted critical rate. If RL exceeds RC (ie. RL/RC is greater than 1.0), one can state with 95 percent confidence that the collision rate at the intersection in question is significantly higher than would normally be expected.
- $$RC = Ra + K(\text{the square root of: } (Ra/m)) + (0.5/m)$$
- Where: Ra = systemwide average collision rate for all traffic signal locations (0.465 collisions per million vehicle entries)
- K = constant (=1.65 for 95 % confidence level)
- m = vehicle exposure at the location in million vehicles entering per year (AWDTx349.6/1,000,000)

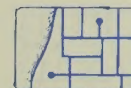
- (c) AWDT - Average Weekday Daily Traffic (total vehicles entering the intersection).
- (d) Improved signal timing or phasing in 1996.
- (e) Approved for reconstruction to add NB/SB left-turn lanes in 1997.
- (f) Referred to Transportation Dept. (Roads Division) for NB/SB left-turn lane design and programming.
- (g) Improved signal display in 1996.
- (h) Referred to Transportation Dept. (Roads Division) for EB/WB left-turn lane design and programming.
- (i) Improved signing in 1996.
- (j) Signal phasing changed in 1997.
- (k) Reconstructed in 1993 to provide channelized left-turn lanes.
- (l) Temporary delineation to discourage illegal movements installed in 1991. Permanent installation placed in 1993.
- (m) Signing design under review.
- (n) Installation of delineation to discourage illegal movements installed in 1990.

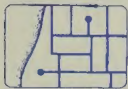
*-Excluding Intersection Pedestrian Signals, excluding MTO-owned signals maintained by the Region, including 2 right-turn slot signals.

Exhibit 2.4

TWO-WAY STOP INTERSECTIONS WITH THE HIGHEST COLLISION RATES FROM 1992 TO 1996

INTERSECTION	AVG. 3-YR		NUMBER OF COLLISIONS					5-YR		COMMENT
	RL (a)	RC (b)	RL/RC	AWDT (c)	1992	1993	1994	1995	1996	
1 PARK ST & VINE ST	4.11	2.08	1.97	2925	6	7	3	5	0	4.20 (d,e)
2 FERGUSON AVE & JACKSON ST	2.62	2.04	1.29	3053	3	4	1	2	4	2.80
3 BARTON ST & MACNAB ST	2.62	1.27	2.06	8966	11	8	10	10	2	8.20 (d)
4 BOOK RD & FIDDLERS GREEN (A)	2.30	1.30	1.77	8443	1	5	8	11	9	6.80 (d,s)
5 CAROLINE ST & CHARLTON AVE	2.15	1.31	1.64	8243	8	9	4	5	5	6.20 (f,g)
6 CATHARINE ST & JACKSON ST	1.88	1.28	1.46	8754	4	6	8	5	*	5.75 (h,i,j,k)
7 HUNTER ST & WALNUT ST	1.80	1.46	1.24	6341	6	3	4	5	2	4.00
8 CARLUKE RD & FIDDLERS GREEN (A)	1.72	1.46	1.18	6320	5	5	2	1	6	3.80 (d)
9 HUGHSON ST & JACKSON ST	1.71	1.61	1.06	5014	2	5	2	*	*	3.00 (l)
10 HUGHSON ST & REBECCA ST	1.70	1.61	1.06	5061	0	4	5	*	*	3.00 (l)
11 MAIN ST (F) & PARKSIDE DR	1.29	1.36	0.95	7558	6	3	4	2	2	3.40 (l)
12 CANNON ST & MACNAB ST	1.04	0.97	1.08	20370	5	10	11	9	2	7.40 (m)
13 BARNESDALE AVE & CANNON ST	1.00	1.09	0.91	13759	4	6	3	6	5	4.80
14 MEADOWBROOK DR (A) & WILSON ST/HWY 2	0.98	1.28	0.76	8758	3	2	4	4	2	3.00
15 FIDDLERS GREEN (A) & JERSEYVILLE RD	0.98	1.45	0.68	6427	0	4	3	2	2	2.20
16 FOREST AVE & HUGHSON ST	0.94	1.64	0.58	4850	1	5	0	0	2	1.60
17 CHARLTON AVE & HUGHSON ST	0.93	1.26	0.74	9241	0	3	4	5	*	3.00 (n)
18 KING ST & PARADISE RD	0.76	0.94	0.81	22584	2	6	8	8	6	6.00 (i,j,o,p,q)
19 BARTON ST & HUGHSON ST	0.75	1.08	0.70	14411	7	4	2	2	4	3.80
20 KING ST & WEST AVE	0.73	0.92	0.80	24139	6	5	10	3	7	6.20
21 NEBO RD (G) & WHITE CHURCH RD	0.68	1.94	0.35	3361	1	0	1	2	0	0.80
22 HUGHSON ST & YOUNG ST	0.67	1.35	0.50	7646	3	1	2	2	1	1.80
23 REDMOND/RIDGEMOUNT & STONE CHURCH RD	0.63	1.10	0.58	13596	3	4	2	*	*	3.00 (r)
24 HERKIMER ST & MACNAB ST	0.63	1.15	0.55	11806	3	4	1	2	3	2.60





1996 Hamilton-Wentworth Collision Report

Volume 1

LOCATIONS

INTERSECTION	RL (a)	RC (b)	RL/RC	AVG.3-YR AWDT (c)	NUMBER OF COLLISIONS					5-YR AVG.	COMMENT
					1992	1993	1994	1995	1996		
										(n)	
25 GARTH ST & SANATORIUM RD	0.59	0.98	0.60	19517	5	5	3	3	*	4.00	
26 AUGUSTA ST & JOHN ST	0.55	0.94	0.59	22707	7	3	4	5	3	4.40	
27 CAROLINE ST & HERKIMER ST	0.55	1.13	0.49	12412	0	1	5	2	4	2.40	
28 STEVEN ST & WILSON ST	0.55	1.13	0.49	12470	1	3	2	3	3	2.40	
29 MUD ST & PRITCHARD RD	0.54	0.95	0.56	21242	5	4	5	4	2	4.00	
30 KING ST & PAISLEY AVE	0.53	1.08	0.49	14162	3	4	1	5	0	2.60	
31 CHARLTON AVE & VICTORIA AVE	0.52	1.05	0.50	15318	1	4	1	3	5	2.80	
32 BALSAM AVE & CANNON ST	0.50	1.00	0.50	18195	2	5	4	3	2	3.20	
33 MARKLAND ST & QUEEN ST	0.50	0.98	0.51	19543	2	6	2	2	5	3.40	
34 CROCKETT ST & UPPER GAGE AVE	0.49	1.03	0.48	16271	5	2	1	3	3	2.80	
35 PARK ST & ROBINSON ST	0.47	2.30	0.21	2418	0	0	0	1	1	0.40	
36 INVERNESS AVE & UPPER WELLINGTON ST	0.47	1.02	0.46	17202	3	5	0	4	2	2.80	
37 GOLFLINKS RD (A) & LEGEND/MEADOWLANDS	0.45	1.21	0.37	10211	0	1	3	3	1	1.60	
38 BRUCEDALE AVE & UPPER SHERMAN AVE	0.44	0.98	0.45	19336	3	7	0	1	4	3.00	
39 CANNON ST & FERGUSON AVE	0.43	0.99	0.43	18647	5	2	1	3	3	2.80	
40 JAMES ST & ROBERT ST	0.42	1.24	0.34	9493	0	3	1	0	3	1.40	(l)
41 BENDAMERE AVE & UPPER PARADISE RD	0.41	1.41	0.29	6927	2	1	0	*	*	1.00	
42 COMMUNITY AVE & GRAYS RD	0.41	1.17	0.35	11254	0	1	2	5	0	1.60	
43 BRUCEDALE AVE & UPPER WENTWORTH ST	0.40	1.12	0.36	12875	3	2	1	1	2	1.80	
44 EVA ST/MILES RD & RYMAL RD/HWY 53	0.39	0.94	0.41	22210	1	6	4	3	1	3.00	
45 ARROWSMITH RD & CENTENNIAL PKWY	0.35	0.82	0.43	37162	2	8	6	3	4	4.60	
46 BARNESDALE AVE & KING ST	0.35	0.96	0.37	21195	3	3	2	4	1	2.60	
47 KING ST & LAWRENCE AVE	0.33	0.86	0.38	31478	2	4	3	3	6	3.60	
48 SOUTH BEND RD & UPPER WELLINGTON ST	0.31	1.03	0.30	16394	1	2	2	1	3	1.80	
49 GAGE AVE & MAPLEWOOD AVE	0.31	1.18	0.26	11002	1	1	2	1	1	1.20	
50 HALSON ST (A) & WILSON ST/HWY 2	0.31	0.95	0.33	21456	0	4	3	*	*	2.33	(r)

OVERALL STATISTICS FOR INTERSECTIONS: 0.47

1.9

NUMBER OF HAMILTON-WENTWORTH 2 WAY-STOP INTERSECTIONS WITH MEASURED TRAFFIC VOLUME 1996 = 116



Notes:

- (a) RL is the number of collisions, per million vehicles entering the intersection, occurring within 31 feet of an individual intersection.
- (b) RC is a volume-adjusted critical rate. If RL exceeds RC (ie. RL/RC is greater than 1.0), one can state with 95 percent confidence that the collision rate at the intersection in question is significantly higher than would normally be expected.
- $$RC = Ra + K(\text{the square root of: } (Ra/m)) + (0.5/m)$$
- Where: Ra = systemwide average collision rate for all 2-way stop locations (0.472 collisions per million vehicle entries)
- K = constant (=1.65 for 95 % confidence level)
- m = vehicle exposure at the location in million vehicles entering per year (AWDTx349.6/1,000,000)
- (c) AWDT - Average Weekday Daily Traffic (total vehicles entering the intersection).
- (d) Improved signing in 1995.
- (e) Installed No Stopping zone to improve visibility in 1996.
- (f) Installed No Stopping zone to improve visibility in 1995.
- (g) Moved hydro pole to improve visibility in 1996.
- (h) Converted to All-Way Stop in 1996.
- (i) Improved signing in 1996.
- (j) Improved lane markings in 1996.
- (k) Installed overhead flasher in 1996.
- (l) Converted to All-Way Stop in 1995.
- (m) Lane markings to be improved in 1997.
- (n) Converted to Intersection Priority Signal in 1996.
- (o) Relocated flasher on curve on island in 1997.
- (p) Installed raised pavement markers on curb edge in 1997.
- (q) Intersection contains sharp curve.
- (r) Converted to Traffic Signal in 1995.
- (s) Removed trees to improve visibility in 1995.

* Data not applicable.

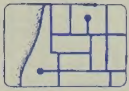


Exhibit 2.5

**ALLWAY-STOP INTERSECTIONS WITH THE HIGHEST COLLISION RATES
FROM 1992 TO 1996**

INTERSECTION	RL (a)	RC (b)	RL/RC	AVG. 3-YR AWDT (c)	NUMBER OF COLLISIONS					5-YR AVG.	COMMENT
					1992	1993	1994	1995	1996		
1 HORNING DR & UPPER HORNING RD	3.61	4.83	0.75	950	4	2	0	0	0	1.2	(e)
2 HUGHSON ST & KING WILLIAM ST	1.34	2.62	0.51	3197	*	3	2	1	0	1.5	(f)
3 MOHAWK RD & UPPER KENILWORTH AVE	0.53	1.87	0.28	7620	1	2	3	1	0	1.4	
4 AIRPORT RD (G) & HOMESTEAD DR	0.47	2.02	0.23	6094	1	2	0	2	0	1.0	
5 HUCKLEBERRY DR & LAKE AVE	0.43	1.84	0.23	8000	2	0	2	1	1	1.2	
6 STONE CHURCH RD & UPPER SHERMAN AVE	0.42	1.43	0.29	18945	4	2	2	*	*	2.8	(d)
7 FORSYTH AVE & KING ST	0.33	1.79	0.18	8772	2	2	0	1	0	1.0	
8 SANATORIUM RD & UPPER PARADISE RD	0.32	1.67	0.19	10817	0	4	1	0	1	1.2	
9 GREENHILL AVE & QUIGLEY RD	0.25	1.77	0.14	9057	0	0	3	0	1	0.8	
10 PARAMOUNT DR & UPPER MOUNT ALBION RD	0.18	1.73	0.10	9752	0	0	0	3	0	0.6	

AVERAGE RATE FOR ALL INTERSECTIONS:

0.79



Notes:

(a) RL is the number of collisions, per million vehicles entering the intersection, occurring within 31 feet of an individual intersection.

(b) RC is a volume-adjusted critical rate. If RL exceeds RC (ie. RL/RC is greater than 1.0), one can state with 95 percent confidence that the collision rate at the intersection in question is significantly higher than would normally be expected.

$$RC = Ra + K(\text{the square root of: } (Ra/m)) + (0.5/m)$$

Where: Ra = systemwide average collision rate for all all-way stop locations (0.787 collisions per million vehicle entries)

K = constant (=1.65 for 95 % confidence level)

m = vehicle exposure at the location in million vehicles entering per year (AWDTx349.6/1,000,000)

(c) AWDT - Average Weekday Daily Traffic (total vehicles entering the intersection).

(d) Converted to Traffic Signal in 1995.

(e) Upper Horning closed at Freeway in 1995.

(f) Improved WB stop sign visibility in 1995.

* Data not applicable.



Exhibit 2.6

URBAN ROAD SECTIONS WITH THE HIGHEST COLLISION RATES FROM 1992 TO 1996 SIGNALIZED INTERSECTIONS NOT INCLUDED

ARTERIAL STREET		From	To	Number of Collisions	RL	RC Ratio	Link (Km)	Volume (AWDT)	Million Veh-Km/Yr
1	BARTON ST	QUEEN ST	JAMES ST	76	7.76	3.66	2.12	0.872	6429
2	CHARLTON AVE	JAMES ST	JOHN ST	34	6.73	4.53	1.49	0.244	11854
3	QUEEN ST	ABERDEEN AVE	HERKIMER ST	39	5.91	4.13	1.43	0.282	13341
4	MAIN ST	KENILWORTH AVE	BERRY AVE	201	5.89	2.74	2.15	0.702	27821
5	WENTWORTH ST	CHARLTON AVE	DELAWARE AVE	32	5.61	4.34	1.29	0.351	9250
6	BARTON ST	GAGE AVE	OTTAWA ST	156	5.45	2.84	1.92	0.860	19014
7	KING ST	PARADISE RD	NEWTON AVE	113	5.33	3.02	1.76	0.781	15525
8	JAMES ST	BARTON ST	MURRAY ST	9	5.29	7.11	0.74	0.120	8176
9	WENTWORTH ST	DELAWARE AVE	KING ST	32	5.00	4.18	1.20	0.500	7302
10	BARTON ST	JAMES ST	WELLINGTON ST	89	4.92	3.13	1.57	0.836	12403
11	JAMES ST	MURRAY ST	BURLINGTON ST	50	4.81	3.60	1.34	0.890	6687
12	MARKLAND AVE	QUEEN ST	JAMES ST	9	4.74	6.75	0.70	0.823	1331
13	BARTON ST	WELLINGTON ST	WENTWORTH ST	120	4.73	2.91	1.63	0.872	16630
14	QUEEN ST	KING ST	BARTON ST	40	4.68	3.81	1.23	0.823	5938
15	KING ST	WELLINGTON ST	WENTWORTH ST	180	4.62	2.68	1.72	0.866	25744
16	BRITANNIA AVE	BARONS AVE	STRATHEARNE AVE	28	4.55	4.23	1.08	0.488	7192
17	KING ST	QUEEN ST	JAMES ST	157	4.37	2.72	1.61	0.860	23917
18	KENILWORTH AVE	KENILWORTH ACCESS	MAIN ST	136	4.30	2.78	1.55	0.695	26018
19	CHARLTON AVE	QUEEN ST	JAMES ST	55	4.18	3.38	1.24	0.823	9143
20	BAY ST	KING ST	CANNON ST	34	4.15	3.86	1.08	0.450	10444
21	LIMERIDGE RD	UPPER WENTWORTH ST	UPPER SHERMAN AVE	92	4.13	2.99	1.38	0.808	15783
22	STINSON ST	VICTORIA AVE	WENTWORTH ST	23	4.07	4.36	0.93	0.665	4875
23	BARTON ST	SHERMAN AVE	GAGE AVE	103	3.92	2.89	1.36	0.872	17228
24	SHERMAN AVE	MAIN ST	KING ST	27	3.88	4.07	0.95	0.427	9341
25	KING ST	SHERMAN AVE	GAGE AVE	117	3.85	2.80	1.38	0.915	18993

1.82

OVERALL STATISTICS FOR ARTERIAL STREETS:

URBAN ROAD SECTIONS WITH THE HIGHEST COLLISION RATES FROM 1992 TO 1996 INTERSECTIONS NOT INCLUDED

	ARTERIAL STREET	From	To	Number of Collisions	RL	RC	Ratio	Link (Km)	Volume (AWDT)	Million Veh-Km/Yr
1	KING ST	QUEEN ST	JAMES ST	157	4.37	1.92	2.28	0.860	23917	7.19
2	LIMERIDGE RD	UPPER WENTWORTH ST	UPPER SHERMAN AVE	90	4.04	2.14	1.89	0.808	15783	4.46
3	CHARLTON AVE	JAMES ST	JOHN ST	18	3.56	3.46	1.03	0.244	11854	1.01
4	KENILWORTH AVE	KENILWORTH ACCESS	MAIN ST	97	3.07	1.97	1.56	0.695	26018	6.32
5	BARTON ST	JAMES ST	WELLINGTON ST	55	3.04	2.26	1.35	0.836	12403	3.62
6	UPPER JAMES ST	LIMERIDGE RD	MOHAWK RD	133	2.82	1.82	1.55	1.049	25680	9.42
7	BAY ST	KING ST	CANNON ST	23	2.80	2.88	0.97	0.450	10444	1.64
8	KING ST	PARADISE RD	NEWTON AVE	58	2.74	2.17	1.26	0.781	15525	4.24
9	BARTON ST	GAGE AVE	OTTAWA ST	78	2.73	2.02	1.35	0.860	19014	5.72
10	JAMES ST	ST. JOSEPH'S DR	KING ST (N. BRANCH)	72	2.72	2.05	1.33	0.968	15642	5.29
11	KING ST	WELLINGTON ST	WENTWORTH ST	104	2.67	1.89	1.41	0.866	25744	7.79
12	BRAMPTON ST	STRATHEARNE AVE	PARKDALE AVE	12	2.67	3.62	0.74	0.720	3582	0.90
13	WENWORTH ST	DELAWARE AVE	KING ST	17	2.66	3.15	0.84	0.500	7302	1.28
14	MARKLAND ST	QUEEN ST	JAMES ST	5	2.63	5.40	0.49	0.823	1331	0.38
15	SANFORD AVE	KING ST	BARTON ST	16	2.60	3.20	0.81	0.787	4454	1.23
16	BARTON ST	WELLINGTON ST	WENTWORTH ST	65	2.56	2.07	1.24	0.872	16630	5.07
17	QUEENSTON RD	NASH RD	CITY LIMITS	93	2.46	1.90	1.29	0.823	26256	7.55
18	QUEEN ST	KING ST	BARTON ST	21	2.46	2.84	0.87	0.823	5938	1.71
19	BARTON ST	OTTAWA ST	KENILWORTH AVE	63	2.40	2.06	1.17	0.860	17421	5.24
20	KING ST	CATHARINE ST	WELLINGTON ST	50	2.35	2.16	1.09	0.531	22968	4.26
21	ARKLEDUN AVE	JOLLEY CUT	JOHN ST	48	2.35	2.19	1.07	0.400	29274	4.09
22	JAMES ST	BARTON ST	MURRAY ST	4	2.35	5.72	0.41	0.120	8176	0.34
23	MAIN ST	KENILWORTH AVE	BERRY AVE	80	2.34	1.94	1.21	0.720	27821	6.83
24	JAMES ST	KING ST (N. BRANCH)	BARTON ST	40	2.34	2.30	1.02	0.860	11382	3.42
25	MOHAWK RD	UPPER PARADISE RD	GARTH ST	93	2.33	1.88	1.24	0.839	27179	7.97

OVERALL STATISTICS FOR ARTERIAL STREETS:

1.18





Notes: Collision Rates on Roadway Sections

1. Exhibit 2.6 includes all collisions on arterial roadway sections excluding those which occur within nine metres of a signalized intersection. If the roadway section ends at an unsignalized intersection, one-half the number of collisions occurring at the intersection is included.
2. Exhibit 2.7 includes only collisions on arterial roadway sections which occur greater than nine metres from any intersection. That is, no collisions referenced to an intersection, signalized or unsignalized, are included.
3. RL is the collision rate for the roadway section expressed as collisions per million vehicle kilometres travelled per annum.
4. RC is a volume-adjusted critical rate. If RL exceeds RC (ie. RL/RC is greater than 1.0), one can state with 95 percent confidence that the collision rate at the intersection in question is significantly higher than would normally be expected.

$$RC = Ra + K(\text{the square root of: } (Ra/m)) + (0.5/m)$$

Where: Ra = systemwide average collision rate for all roadway sections:

- 1.82 collisions per million vehicle kilometres in 1992-1996 for Exhibit 2.6;
- 1.18 collisions per million vehicle kilometres in 1992-1996 for Exhibit 2.7.

K = constant (=1.65 for 95 % confidence level)

m = vehicle exposure for the individual roadway section in million vehicle kilometres per year (AWDT x Section Length x 349.6/1,000,000)

5. AWDT - Average Weekday Daily Traffic

1996 COLLISION STATISTICS - SELECTED CANADIAN CITIES

CITY OR REGIONAL MUNICIPALITY	POPULATION	PROPERTY DAMAGE ONLY				COLLISION REPORTING CRITERIA (1)			TOTAL COLLISIONS	COLLISIONS /1,000 POPULATION	INJURY COLLISIONS /1,000 POPULATION
		COLLISION REPORTING LEVEL	COLLISION REPORTING			COLLISIONS /1,000 POPULATION	INJURY COLLISIONS /1,000 POPULATION				
			(a)	(b)	(c)			(d)			
CITIES											
HAMILTON	322,352	\$700.00	N	N	Y	Y	f	4,473	13.9	1,669	5.2
CALGARY (1994)	738,184	\$1,000.00	N	N	N	Y	e, f	26,291	35.6	2,729	3.7
EDMONTON	616,369	\$1,000.00	N	N	N	Y		17,761	28.8	5,069	8.2
HALIFAX	330,000	\$1,000.00	Y	Y	Y	Y		5,106	15.5	1,007	3.1
LONDON	326,000	\$700.00	Y	Y	Y	Y		10,919	33.5	2,024	6.2
MONTREAL	1,020,000	\$500.00	N	N	N	Y	g	22,866	22.4	4,831	4.7
MISSISSAUGA (8)	574,000	\$700.00	N	N	N	Y		5,314	9.3	953	1.7
REGINA (1994)	179,178	\$1,000.00	N	N	N	Y	f	5,751	32.1	1568 (2)	0.0
SASKATOON	204,678	\$1,000.00	N	N	N	Y	f	7,343	35.9	1,179	6.0
METRO TORONTO (1995)	2,187,000	\$700.00	Y	Y	Y	Y	e, f	49,419	22.6	16,202 (3)	7.4
VANCOUVER	535,700	\$1,000.00	N	N	N	Y	f	15,413	28.8	5,565	10.4
WINDSOR	200,000	\$1,000.00	N	N	N	Y		3,313	16.6	1,074	5.4
WINNIPEG	630,374	\$1,000.00	Y	Y	Y	Y	f	15,831	25.1	4,195	6.7





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CITY OR REGIONAL MUNICIPALITY	POPULATION	PROPERTY DAMAGE ONLY				COLLISION COLLISION REPORTING REPORTING CRITERIA (1)			TOTAL COLLISIONS	COLLISIONS /1,000 POPULATION	INJURY COLLISIONS /1,000 POPULATION
		COLLISION COLLISION REPORTING REPORTING CRITERIA (1)									
		LEVEL	(a)	(b)	(c)	(d)	Other				
REGIONS											
REGIONAL HAMILTON- WENTWORTH (4)	467,799	\$700.00	N	N	Y	Y	f	5,687	12.2	2,103	4.5
REGION OF HALTON (6)	339,875	\$700.00	N	N	Y	Y		5,257	15.5	912	2.7
REGIONAL OTTAWA-CARLTON (1995)	696,048	\$700.00	N	N	N	Y	e,f	14,145	20.3	3,668	5.3
REGIONAL MUNICIPALITY OF PEEL (5) (1995)	879,100	\$700.00	Y	Y	Y	Y	e,f	3,545	4.0	800	0.9
REGIONAL WATERLOO (7) (1995)	419,150	\$700.00	Y	Y	Y	Y	f	12,716	30.3	1,668	4.0

(1) KEY TO CRITERIA FOR REPORTING COLLISIONS (See next page for definitions of injury collisions)

It is generally assumed, unless otherwise noted, that only collisions occurring on public roadways involving personal injury or property damage greater than the reporting level are included on this table.

- (a) Collisions reported involving an infraction of the Provincial Highway Traffic Act with property damage only and less than reporting level.
- (b) Collisions reported involving an infraction of the Criminal Code of Canada with property damage only and less than reporting level.
- (c) Hit and run collisions reported with property damage only and less than reporting level.
- (d) Collisions reported if it involves any personal injury.
- (e) Public property damage collisions.
- (f) Collisions involving City or Regional government vehicles.
- (g) "With the introduction of amicable constat by insurance companies in July, 1979, a great number of accidents with material damages are not reported and are out of control".

(2) Only injuries requiring medical attention were classified as injury collisions.

(3) Injury collisions do not include fatal collisions.

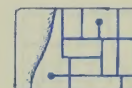
(4) Not including Kings Highways.

(5) Regional municipality statistics are for Regional roads only and do not include Burlington, in the case of Halton, or Mississauga, Brampton, or Caledon, in the case of Peel. Thus, the collision rates stated will substantially underrepresent the actual rates for all roads within that Regional municipality.

(6) Regional Municipality of Halton statistics are for ALL Regional roads, within Halton Region as provided by Halton Region Police.

(7) Regional Municipality of Waterloo statistics are for both Regional and area municipality roads. Injury collisions include fatal collisions.

(8) Data is for City roadways only, and does not include Regional roadways. Thus, the collision rates stated will underrepresent the overall rates.



DEFINITIONS OF "PERSONAL INJURY" (a)

Regional Hamilton-Wentworth	- any bodily harm, visible or complained of, that results from a motor vehicle collision.
City of Hamilton	- any bodily harm, visible or complained of, that results from a motor vehicle collision.
Calgary	- any type of injury resulting from a collision.
Edmonton	- including minor abrasions and bruises, complaint of pain, caused by a motor vehicle collision.
Halifax	- injury or death (no stipulation regarding severity of injury) caused by a motor vehicle collision.
London	- any type of injury, visible or complained of, caused by a collision; need not be treated at a hospital.
Mississauga	- N/A
Metro Toronto	- injury must be reported when an injury occurs to any of the involved persons in a collision.
Montreal	- any injury, apparent or not, to any person, caused directly or indirectly, by a motor vehicle.
Regina	- any bodily harm, visible or complaint of, caused by the accident.
Saskatoon	- any bodily harm, visible or complaint of, caused by the accident.
Vancouver	- N/A
Windsor	- any injury resulting from a motor vehicle collision.
Winnipeg	- readily identifiable injury or perceived injury caused by a collision.
Region of Halton	- any bodily harm, visible or complaint of, that results from a motor vehicle collision.
Regional Municipality of Niagara	- any type of injury resulting from a collision.
Regional Municipality of Peel	- any bodily harm, visible or complaint of, that results from a motor vehicle collision.
Regional Ottawa-Carlton	- injury is any bodily harm, visible or complained of, caused by a motor vehicle collision.
Region of Waterloo	- injury or death caused by a motor vehicle collision.

(a) Definitions of a "personal injury" such that a collision involving a personal injury must be reported.



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